Conseil
supérieur
de l'éducation

SCIENTIFIC EDUCATION FOR STUDENTS AT THE SECONDARY LEVEL

Advice to the Minister of Education
June 1984

CSE

The Committee on proposed amendments to the "Regulation Respecting the Basis of the Secondary School Organization"

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Advice adopted at the 298th session of the
Conseil supérieur de l'éducation
on 21 June 1984

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Recommendation adopted at the 298th session of the Conseil supérieur de l'éducation on 21 June 1984

INTRODUCTION

On February 17, 1984, the Conseil supérieur de l'éducation was requested by the Minister to give its advice concerning proposed amendments to the "Regulation Respecting the Basis of Secondary School Organization" (see Appendix I).

The ministerial proposal is aimed at correcting two major problems concerning the scientific education of secondary level students. The first concerns access to curricula relating to Natural Sciences, Health Sciences and certain professional training programs at the college level. The second concerns more specifically the continuity and intensity of scientific education. The ministerial proposal raises issues of crucial importance, and will have important socio-cultural, political, administrative and pedagogical repercussions. When the Academic Regulations* were adopted, the Department placed considerable importance on certain objectives which had emerged following wide-spread consultation: the importance of basic education; the necessity for quality teaching; the imperative requirement of a sustained student-teacher relationship and the development of technological and scientific education. The Council proposes to examine the advisability of the ministerial proposal in the light of these policy statements.

The Council is aware of the opposition to any amendment to Academic Regulations which, in 1983-1984, are only in their second year of appli-

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* "Academic Regulations": refers to the "Basis of Secondary School Organization".

cation. The briefs received by the Council concerning this subject[1] illustrate adequately the difficulty of reconciling the total teaching time prescribed by the Academic Regulations with the time prescribed by its subject schedule for the teaching of each subject: either the pupil has a reduced choice of optional courses, or the time allocated to any given course is reduced, or the margin of two or more credits out of the thirty-six prescribed is reduced or even eliminated. Although it approved the Academic Regulations as enacted, the Council has reached the conclusion that these Regulations must be amended in order to ensure that secondary level students receive a worthwhile scientific education.

1. See the list in Appendix V.

1. THE PROBLEM

1.1 *THE PRESENT SITUATION*

As the instrument of an extensive consultation, the *Green Paper* (1977) recommended that Experimental Sciences be compulsory in first and second grades of the secondary level, and that Economics be optional in third grade.

The *Québec school* (1979) reversed the proposition: the Home Economics course would become compulsory for boys and girls in second grade and a course in Science (Physics) would be optional in second or third grade of the secondary level.

Moreover, several programs, initially prepared for presentation on a 3 period per week basis (75 h), would now be presented on a 4 period basis (100 h).

The *Regulation Respecting the Basis of Secondary School Organization* (1981) confirmed these proposals (see subject schedule in Appendix II). As a consequence, the compulsory scientific model appeared as follows:

Chart I

Chart: Compulsory model according to the Academic Regulations

Grade	Secondary I	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6 CR)	Basic (6 CR)	Basic (4 CR)	Basic (4 CR)	Basic (4 CR)
Science course	Ecology (4 CR)		Biology (4 CR) Introduction to Technology (4 CR)	Chemistry I (4 CR) or Physics I (4 CR)	
Time devoted to sciences	100 H		200 H	100 H	
Margin	2 CR	2 CR	4 CR	8 CR	12 CR

According to the Canada Science Council, this model is a step in the right direction, taking into account the compulsory (in Secondary 3) course of Introduction to Technology. The model provides a good basis for a sound scientific and technological education[2].

On the other hand, if an attempt is made to provide a good basic education and sustained student-teacher relationships, there are certain obvious drawbacks:

A) The subject schedule and the time allocation schedule are overburdened. The students must follow ten or eleven different programs provided in most cases by ten or eleven teachers. Such a situation is far from promoting sustained student-teacher relationships.

B) From the point of view of scientific education, the subject-schedule leads to two extreme models, both of which are found to be deficient in regard to either of the basic objectives of the reform advocated by the Academic Regulations. The first model corresponds to a *minimal scientific content* (as illustrated in Chart I), i.e. 300 hours of science with an additional 100 hours of Introduction to Technology. When analyzed closely, this model is shown to be inadequate in providing a balanced education to students who are bound to live in a technological society. The lack of a Science course in Secondary 2, combined with the option between Chemistry or Physics in Secondary 4, gives the student the possibility of avoiding Physics entirely throughout his secondary course. In addition, a successful mark in the basic Mathematics course in Secondary 5 is not a prerequisite for the Diploma in Secondary Studies. As a result, at the collegiate level, a student with a Secondary Studies Diploma may have to devote more than two sessions to acquire the pre-requisites for certain scientific options.

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2. Canada Science Council, Report No. 36. Learning Sciences, pp. 46-48.

The second model is that of the student who, in order to guarantee his choice of any of the college options, chooses a *maximal scientific content*. He therefore takes as many options as possible and devotes as much time as possible to sciences and mathematics: 800 hours in sciences and technology including 300 hours in Secondary 3 (cf. Chart II);

Chart II

Chart: Scientific model according to the Academic Regulations

Grade	Secondary I	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6 CR)	Basic (6 CR)	Basic (4 CR)	Basic (4 CR) Option I (4 CR)	Basic (4 CR) Option II (4 CR)
Science course	Ecology (4 CR)		Biology (4 CR) Physics (4 CR) Intr. to Technology (4 CR)	Chemistry I (4 CR) Physics I (4 CR)	Chemistry II (4 CR) Physics II (4 CR)
Time devoted to sciences	100 H		300 H	200 H	200 H
Margin	2 CR	2 CR	0	0	0

Such a model limits access to optional courses such as Data Processing, Arts, Technological education, etc. Students having the desire and specific aptitudes for sciences should not be made to choose a course model which does not provide them with a diversified basic education.

1.2 *MINISTERIAL PROPOSAL*

The two problems which the ministerial proposal attempts to solve, in short, are the following: there is *too little science* in the basic

educational model (universally compulsory), and *too much science* in the optional model (considered as a prerequisite for college). This proposal is as follows:

A) For Secondary 4: offering students a choice between two courses including both Chemistry and Physics, the more substantial of which would allow direct access to the optional courses of Secondary 5 required for admission to the scientific options at college.

B) For Secondary 2: instituting a compulsory Physics course, worth 2 credits. For this purpose, reducing the Home Economics course, worth 4 credits, to 2 credits. Each local body could use its margin - 2 credits - to grant 4 credits to one or the other course. (cf Chart III).

Chart III

Chart: Compulsory model according to the ministerial proposal

Grade	Secondary I	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6 CR)	Basic (6 CR)	Basic (4 CR)	Basic (4 CR)	Basic (4 CR)
Science course	Ecology (4 CR)	* Physics (2 CR)	Biology (4 CR) Intr. to Technology (4 CR)	Science 414 (4 CR)	
Time devoted to science	100 H	50 H	200 H	100 H	
Margin	2 CR	2 CR	4 CR	8 CR	12 CR

* The two Physics credits are taken from the Home Economics course.

Chart: Scientific model according to the ministerial proposal

Grade	Secondary I	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathe-matics	Basic (6 CR)	Basic (6 CR)	Basic (4 CR)	Basic (4 CR) Option I (4 CR)	Option II (4 CR)
Science course	Ecology (4 CR)	* Physics (2 CR)	Biology (4 CR) Intr. to Technology (4 CR)	Science 434 (4 CR)	Chemistry (4 CR) Physics (4 CR)
Time de-voted to sciences	100 H	50 H	200 H	100 H	200 H
Margin	2 CR	2 CR	4 CR	8 CR	12 CR

As can be seen, this proposal reduces from eight credits to four the possible options in Chemistry and Physics; on the other hand, it allows the student a choice from among other sciences such as Biology, Geology or Introduction to Data Processing. Finally, the proposal increases *compulsory* scientific education by two credits (50 hours) for all students. This, however, is at the expense of the Home Economics course which loses two credits.

1.3 *WHAT IS INVOLVED*

A) *Access to certain programs at the college level*

The Compulsory and optional courses provided by the Academic Regulations at the secondary level are inadequate for meeting the

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* The two Physics credits are taken from the Home Economics course.

requirements of certain educational models: Natural Sciences, Health Sciences and certain vocational training programs. Three studies ordered by the Department demonstrate the pre-requisites for access to these programs in Chemistry, Physics and Mathematics.

The minimal requirements for admission to these options are presently quite diversified[3]; as a result, there are great disparities in the choice of studies for students preparing for the same program. It therefore appears that it is not so much a question a raising the requirements, as of *standardizing* basic scientific education for all. This would allow the college level to adjust its own requirements as needed.

B) *The lack of continuity in scientific education at the secondary level*

The optional nature of Physics in second or third grade at the secondary level is detrimental to many students who do not succeed in their scientific studies at the secondary level, particularly in Physics. Many students come into contact with Physics for the first time in Secondary 4. It is generally agreed that certain contents of the present Physics program (offered in Secondary 2 or 3) should have been studied by all pupils to enable them to successfully complete their fourth grade. However, with the proposed Secondary 4 Science program, which would combine elements of chemistry and Physics, it would be difficult to ensure that such contents are studied by the pupils.

C) *The choice left to the local bodies*

Leaving to the local bodies the discretion of using their margin to attribute 4 credits either to the Home Economics or Physics course in no way resolves the problems of disparity and lack of

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3. For example, the pre-requisites for "Health Sciences" are: Mathematics 522 or 532, Physics 422 or 432 or 452 and Chemistry 562.

continuity in the students' degree of training. It must be borne in mind that all students would have to successfully follow the Secondary 4 Science course made up of both Chemistry and Physics.

D) *Other aspects*

- *From the pedagogical point of view*, the proposal to reduce the number of credits allocated to Physics and Home Economics results in weakening the contents of these two programs.

- *From the administrative point of view*, the proposal burdens the Secondary 2 institutional scheme by adding one compulsory course which would bring the number of subjects to eleven. This would produce less coherence in the students' education and decrease the possibilities for sustained student-teacher relationship.

2. *THE POSITION OF THE CONSEIL SUPERIEUR DE L'EDUCATION*

The Academic Regulations were amended a number of times, with the official sanction of the Conseil des ministres. While many participants desire the greatest possible stability within the system, they nevertheless demand amendments to the Academic Regulations in order to provide a good scientific education. College requirements have been found to be more demanding than they were at the time of adoption of the Regulations; a smoother transition is sought, which would be based on a broader standardization of basic scientific education. This cannot take place without certain changes that would ensure an improved degree of continuity and give more substance to the scientific model at the secondary level. It is at the same time important that talented and interested students retain the opportunity of enriching their scientific education.

2.1 *THE SCIENCE COURSE IN SECONDARY 4*

The Council agrees with the proposal to amend the content and arrangement

of the science course in Physics and Chemistry in Secondary 4. However, it wishes that the revision of programs which this proposal entails take place with as little change and as little need for new teaching material as possible. Moreover, the scientific education of a secondary level student must retain the characteristics of a general education. While it is normal to anticipate a smooth transition into the college level, the latter should neither be allowed to dictate the contents of the secondary level scientific education nor demand greater "pre-requisites" than those generally expected from a student after eleven years of study.

Establishing two versions of the science course (414 or 434) will offer additional challenges to students who are particularly interested in science, while ensuring an adequate basic education for the other students. Considering that the Department does not propose for Secondary 5 an optional science course in continuity with that offered in Secondary 4, *The Council recommends that the school system be enabled to offer this form of enrichment to students particularly interested in science.* The Department should make such a program available.

2.2 *A COMPULSORY COURSE IN PHYSICS IN SECONDARY 2*

If the science course in Secondary 4 should become compulsory for all, success should also be possible for all. It is therefore important that the best possible preparation be offered to all with respect to the aptitudes that characterize the specific field of science. The best way is to provide continuous scientific education from Secondary 1 to Secondary 3. This is the solution adopted by all the other Canadian provinces. Indeed, Québec is the only province that does not offer *compulsory* teaching in science during the first three years of the secondary level or the equivalent, i.e. 7th, 8th and 9th grades (see Appendix IV for some additional comparative data). The Council is also of the opinion that a Physics course should become compulsory in Secondary 2. The third year of the secondary level course marks the end of compulsory schooling. It is therefore desirable that all students (boys and girls) should have had the opportunity of exploring the various

aspects of science (Ecology, Technology, Physics or Biology) before making their career choices and engaging in the corresponding options. Moreover, the compulsory character of scientific education in Secondary 2 should allow a greater number of girls to pursue scientific studies and thus increase their chances of eventually taking up a scientific or technological career[1]. In a recently published advice to the ministre de l'Éducation, the Council acknowledged the significant decrease in enrolment of girls in scientific options, from Secondary 5 onwards. This decrease is more pronounced at the college level[2]. Taking into account the efforts made to suppress the sexist character of roles - eliminating discriminatory stereotypes and the compulsory character of the programs of Home Economics and Introduction to Technology - introducing a compulsory Physics course in Secondary 2 would contribute to making girls as well as boys familiar with science and technology before reaching the stage of taking up options.

Moreover, the Council recommends that 4 credits be retained for the Secondary 2 program of Physics. Reducing this program to 2 credits would raise the same problems as those mentioned for Home Economics: the objective of a program conceived with 4 credits attached is to ensure an awareness of the importance of science in everyday life, and adopting a critical approach in regard to scientific achievements and their social utilization. These attitudes enhance the development of knowledge both in the field of physical phenomena (Meteorology, Rocks and Minerals, Solutions, Heat and Phase changes) and also in the field of certain applications of these phenomena in daily life[3]; finally, reducing the value of this course to two credits would fix the norms in Québec at 250 hours of science for the first three years of the Secondary level, which would be 50 hours below the minimum Canadian level.

1. The Canada Science Council specifically adopts this view in one of its recommendations. Cf its report "Learning Sciences, Youth Facing its Future" (Report No. 36, April 1984, pp. 39 sq.).

2. Conseil supérieur de l'éducation: The Status of Women in the School System: a Double Perspective; May 1984, p. 7.

3. Secondary Level curricula. Physics (Physical Environment) Ministère de l'Éducation, 1982, p. 6).

2.3 *THE HOME ECONOMICS COURSE*

The Council is against reducing the Home Economics course. The objectives of the Home Economics program still corresponds the boys' and girls' needs for minimal training in managing their daily lives in order to better feed, clothe and house themselves, as well as develop themselves autonomously. This program constitutes a ready support to assist adolescents in assuming both their personal responsibilities and the family responsibility which arise at an increasingly early age. It also introduces them to the decompartmentalization of roles and tasks of family life. On the other hand, from the administrator's point of view, the complex organizational problems (setting up the time allocation schedule and the institutional model, implementing the new programs, etc.), require a minimum of stability to achieve successful operations. In several communities, this was achieved with great effort in terms of physical arrangements and financial investments. Reducing the Home Economics course in Secondary 2 would require starting the whole operation over again, developing and implementing the program, etc.).

The Council therefore favors the following arrangement: (see Chart IV)

- *In Secondary 2:* Physics (4 credits);
- *In Secondary 3:* Home Economics (4 crédits);
- *In Secondary 4:* One Science course (4 credits, comprised of Physics and Chemistry);

- *THIS PROPOSAL:*

  - provides everyone with a more balanced basic scientific education;

  - favors continuity in the development of teaching material and acquisition of equipment;

  - leaves room to manoeuver in Secondary 1 and 2 (2 credits); the importance given by the school boards to this kind of margin is well known: it is applied to remedial, special or optional courses;

- favors group-formation and reorganization of the time schedule by placing Home Economics and Introduction to Technology on the same level, these being two disciplines requiring the same student-teacher relationship;

- places Québec in a fair position among Canadian provinces with respect to time devoted to science and technology;

- ensures greater stability with respect to existing staff.

- *ON THE OTHER HAND, THE PROPOSAL:*

  - moves Home Economics from Secondary 2 to Secondary 3. While this may represent a gain from the point of view of clientele maturity, it may give rise to a transfer of equipment from an exclusively Junior High School to a Senior High School;

  - eliminates any room to manoeuver in Secondary 3, as a direct result of the choice made in favor of maintaining fully the existing Home Economics and Physics programs. This is the major drawback of the proposal. It is perhaps appropriate to recall, as suggested by the Academic Regulations (Section 26), that the School Board may allocate differently the time reserved for each credit, provided it ensures that the compulsory objectives are met and that the compulsory conceptual content in the curricula is acquired. In this connection, the Council observed many cases where positive steps had been taken,

CHART IV: THE COUNCIL'S PROPOSAL

CHART: COMPULSORY MODEL ACCORDING TO THE PROPOSAL OF THE CONSEIL SUPÉRIEUR DE L'ÉDUCATION

Grade	Secondary 1	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6CR)	Basic (6CR)	Basic (4CR)	Basic (4CR)	Basic (4CR)
Science course	Ecology 4 (CR)	Physics (4CR)	Biology (4CR) Intr. to Technology (4CR)	Sciences 414 (4CR)	
Time devoted to science	100 H	100 H	200 H	100 H	
Margin	2 CR	2 CR	0 CR *	8 CR	12 CR

* The Home Economics course for Secondary 2 is moved to Secondary 3 and reduces the margin to zero.

CHART: SCIENTIFIC MODEL ACCORDING TO THE PROPOSAL OF THE CONSEIL SUPÉRIEUR DE L'ÉDUCATION

Grade	Secondary 1	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6CR)	Basic (6CR)	Basic (4CR)	Basic (4CR) Option I (4CR)	Option II (4CR)
Science course	Ecology 4 (CR)	Physics (4CR)	Biology (4CR) Intr. to Technology (4CR)	Sciences 414 (4CR)	Chemistry (4CR) Physics (4CR)
Time devoted to science	100 H	100 H	200 H	100 H	200 H
Margin	2 CR	2 CR	0 CR *	4 CR	4 CR

* The Home Economics course for Secondary 2 is moved to Secondary 3 thus reducing the margin to zero.

CONCLUSION

The Academic Regulations at the Elementary and Secondary levels has created new and greater requirements for all concerned, in relation to scientific education: at the Elementary level, it proposes devoting a specific time to Natural Sciences; in Secondary 1, it introduces a compulsory program of Ecology; it makes the Introduction to Technology courses compulsory for all; finally, in Secondary 4, it imposes a choice in Science (Physics or Chemistry). The preparation of these programs was carried out while giving close consideration to the educational objectives specified in *The Québec School*; the proposed contents and methods are better adapted to the young. At the present time, it is not possible to assess the impact of these programs on the students' general development. The amendments made invite further reflection and encourage the pursuit of the initial operation, with a view to improving continuity, fostering greater respect for the objectives as well as a more balanced scientific education for all students.

The orientation put forward by the Council in the present advice proposes a double objective:

A) ensuring good basic scientific education for all;

B) allowing those wishing to pursue more advanced scientific studies at the college level to acquire wider and more substantial scientific knowledge.

The Council believes, however, that for all concerned, the quality of scientific education must be based on a sound balance between the various kinds of objectives (knowledge, skills, approaches) as they are outlined in the curricula. And such a balance should exist both in dispensing these programs and in carrying out the examinations that

sanction them. Therefore, in the years to come, the question of the number of scientific courses offered to Québec students should never be dissociated from the quality of the education sought after.

RECOMMENDATIONS

The Council recommends:

1) *That the ministerial proposal to amend the content and the arrangement of the science course in Physics and Chemistry in Secondary 4, be retained;*

2) *that in Secondary 2, a compulsory Physics course be instituted (4 credits);*

3) *that the compulsory Home Economics course (4 credits) be moved to Secondary 3;*

4) *that the school system be enabled to offer to students who are particularly interested in the field of science, an optional scientific program in conjunction with that being offered in Secondary 4, such a program being made available by the Ministère de l'Éducation.*

APPENDIX I

Le Ministre de l'Éducation

Québec, February 17, 1984

Mr. Claude Benjamin
Chairman
Conseil supérieur de l'éducation
2050, St-Cyrillle Blvd. West
QUÉBEC (Québec)
G1V 2K8

Mr. Chairman:

The administrative sections of the Ministère de l'Éducation and the school networks have encountered two major problems concerning the scientific education of secondary level students. The first involves access to the programs respecting Natural Sciences, Health Sciences and certain vocational training programs at the college level; the second concerns more particularly the continuity and intensity of the students' scientific education.

The reason for the difficulty in gaining access to certain subjects at the college level can be explained by an insufficient number of courses devoted to basic scientific education. As a matter of fact, the compulsory and optional courses provided by the Academic Regulation fall short of preparing them adequately for certain educational models.

In order to overcome this difficulty, the solution envisaged would consist in offering to 4th grade secondary level students two courses combining both Chemistry and Physics. One of the two courses would be compulsory. The choice between one or the other would depend on the student's aptitudes and interests. The more substantial of the two courses would allow direct access to the optional courses of the secondary level required for admission to the scientific options at the college level. Nevertheless, the students who had followed the other course could, under certain conditions, register for optional courses at the Secondary 5 level.

This hypothesis involves amending sections 33 and 43 of the Regulation Respecting the Basis of Secondary School Organization in order to substitute a compulsory science course in Chemistry and Physics.

The second problem concerns the lack of continuity in the scientific education of secondary level students. As a matter of fact, the Academic Regulation for the secondary level presently excludes any compulsory Science course in the 2nd and 5th grades.

The proposed solution would be to institute a compulsory Science course in Physics in 2nd grade at the secondary level, 2 credits being given to such a course. To do this, it would be necessary to reduce from 4 to 2 the credits given to the Home Economics course. It would however remain possible for each local body to allow students interested in one or the other of these courses to obtain 4 credits instead of 2, by appropriate use of the margins provided by the Academic Regulation.

This proposal involves amending Section 29 of the Academic Regulation, to allocate 2 credits instead of 4 to Home Economics and to institute 2 compulsory credits in Science (Physics)

as well as amending Sections 30 and 32 to allocate 2 credits instead of 4 to Science (Physics), henceforth optional, and 2 credits to Home Economics.

In a nutshell, Mr. Chairman, these are the main problems relating to the scientific education of secondary level students. I fully realize that the proposed solutions will not satisfy all participants. However, they do improve upon the present situation and have the merit of being easily applicable, with a minimum of amendments to the present Academic Regulation. You will appreciate that the expectations of the school network regarding these matters, urge us to attend to these matters at our earliest convenience.

With my utmost regard, I am, Mr. Chairman,

Yours faithfully

THE MINISTER OF EDUCATION

Camille Laurin, m.d.

APPENDIX II

Present regime

credits-year / subjects	Secondary 1	2	3	4	5
Mother tongue	6	6	6	6	6
Mathematics	6	6	6	6	6
Mor. & Rel. instr.	2	2	2	2	2
Physical ed.	2	2	2	2	2
Personal & Soc. ed	1	1	1	1	1
Career Guide	1	1	1	1	1
Second language	4	4	4	4	4
Arts	4	4			
Geog. Hist.& Econ.	4	4	4	4	4
	(Geog)	(Hist)	(Geog Qué)	(Hist Qué)	(Eco-nomy)
Sciences	4		4	④	
	(Ecol.)		(Bio.)	(Chemistry or Physics)	
Technol. educ.			4		
Home Economics		④			
Compulsory courses Total credits	34/36	34/36	32/36	28/36	24/36

Ministerial proposal

credits-year / subjects	Secondary 1	2	3	4	5
	→	→	→	→	
	→	→	→	→	
	→	→	→	→	
	→	→	→	→	
	→	→	→	→	
	→	→	→	→	
	→	→	→	→	
	→	→	→	→	
	→	→	→	→	
	→	→	→	→	
	→	→	→	→	
	→	→	→	→	
	4 (Ecol)	② (Phy-sics)	4 (Bio)	④ (414 434	Physics and Chemistry)
	→	②			
	→				

APPENDIX III

Mr. Robert Gaulin, Président
Centrale de l'Enseignement du Québec

Sir:

Following the discussions which took place at the negociating table with representatives of the Centrale de l'enseignement du Québec, this is to confirm that the subject-schedule (enumerating the subjects by grade or by cycle at the Secondary level) will be determined as it is presently by our Department, but the establishment of the time schedule (teaching time allocated for each subject) will remain under the jurisdiction of each school board, within the framework of the objectives set for each of the curricula.

Moreover, three (3) period-units (50 minutes per period) of their equivalent will not be imposed on teachers as an *organizational method*, subject to the following proviso: the boards which presently use three (3) period-units for certain subject(s) in their time-schedule may maintain them and the boards may implement them in the same manner in their time schedule in situations analogous to those justifying their present use.

FEDERATION OF
CATHOLIC SCHOOL BOARDS
OF QUÉBEC

_____
Jacques Mongeau

THE MINISTER
OF EDUCATION

_____
Jacques-Yvan Morin

APPENDIX IV

COMPARATIVE DATA:

- *MINIMUM TIME IN SECONDARY 1, 2 and 3*

  In 1979, the Ministère de l'Education undertook a study of the time devoted to the teaching of science in eight Canadian provinces. This study covered grades 7, 8 and 9, which includes Secondary 3.

  The minimum time devoted to teaching science is as follows:

Ontario	252 hours
Alberta	342 hours
Manitoba	342 hours
Saskatchewan	342 hours
New-Brunswick	342 hours
British Columbia	342 hours
Nova Scotia	243 hours
Québec	200 hours

  (The ministerial proposal (2 cr. in Physics in Secondary 2) would bring the minimum time to 250 hours, while the Council's recommendation would bring it to 300 hours).

- *SECONDARY LEVEL AS A WHOLE: NUMBER OF COMPULSORY HOURS AND MAXIMUM NUMBER OF HOURS POSSIBLE IN SCIENCE*[1]*: (from 7th to 11th grade)*

Status / Provinces	Compulsory	Concentration in science	
	All	Typical program	Maximum possible
Alberta	300	750[1]	750
British Col.	460	820[1]	940
Ontario	380	820	930
Saskatchewan	400-500[2]	700	700
Québec-actual	300	700[3]	900
-proposed	400	700[3]	800

1. The existing science pre-requisites remain to be confirmed.
2. In 11th grade, the students must choose between 1 Math and 1 Science course.
3. In accordance with the hypothesis that the student chooses one Science course from among his options.

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1. G. Flamand and P. Valois, *L'enseignement des sciences dans 10 pays, 4 provinces canadiennes et au Québec (Teaching science, in 10 Countries, 4 Canadian Provinces and in Québec) November 1983.*

CHART: COMPULSORY MODEL ACCORDING TO THE ACADEMIC REGULATION

Grade	Secondary 1	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6CR)	Basic (6CR)	Basic (4CR)	Basic (4CR)	Basic (4CR)
Science course	Ecology 4 (CR)		Biology (4CR) Intr. to Technology (4CR)	Chemistry 1 (4CR) Physics 1 (4CR)	
Time devoted to science	100 H		200 H	100 H	
Margin	2 CR	2 CR	4 CR	8 CR	12 CR

CHART: COMPULSORY MODEL ACCORDING TO THE MINISTERIAL PROPOSAL

Grade	Secondary 1	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6CR)	Basic (6CR)	Basic (4CR)	Basic (4CR)	Basic (4CR)
Science course	Ecology 4 (CR)	* Physics (2CR)	Biology (4CR) Intr. to technology (4CR)	Sciences 414 (4CR)	
Time devoted to sciences	100 H	50 H	200 H	100 H	
Margin	2 CR	2 CR	4 CR	8 CR	12 CR

* The two credits for Physics are drawn from the Home Economics course.

CHART: COMPULSORY MODEL ACCORDING TO THE PROPOSAL OF THE CONSEIL SUPÉRIEUR DE L'ÉDUCATION

Grade	Secondary 1	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6CR)	Basic (6CR)	Basic (4CR)	Basic (4CR)	Basic (4CR)
Science course	Ecology 4 (CR)	Physics (4CR)	Biology (4CR) Intr. to Technology (4CR)	Sciences 414 (4CR)	
Time devoted to science	100 H	100 H	200 H	100 H	
Margin	2 CR	2 CR	0 CR *	8 CR	12 CR

* The Secondary 2 Home Economics course is moved to Secondary 3 and reduces the margin to zero.

APPENDIX IV-2

CHART: SCIENTIFIC MODEL ACCORDING TO THE ACADEMIC REGULATION

Grade	Secondary 1	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6CR)	Basic (6CR)	Basic (4CR)	Basic (4CR) Option I (4CR)	Basic (4CR) Option II (4CR)
Science course	Ecology (4CR)		Biology (4CR) Physics (4CR) Intr. to Technology (4CR)	Chemistry I (4CR) Physics I (4CR)	Chemistry II (4CR) Physics II (4CR)
Time devoted to science	100H		300 H	200 H	200 H
Margin	2 CR	2 CR	0	0	0

CHART: SCIENTIFIC MODEL ACCORDING TO THE MINISTERIAL PROPOSAL

Grade	Secondary 1	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6CR)	Basic (6CR)	Basic (4CR)	Basic (4CR) Option I (4CR)	Option II (4CR)
Science course	Ecology 4 (CR)	* Physics (2CR)	Biology (4CR) Intr. to Technology (4CR)	Sciences 434 (4CR)	Chemistry (4CR) Physics (4CR)
Time devoted to sciences	100 H	50 H	200 H	100 H	200 H
Margin	2 CR	2 CR	4 CR	4 CR	4 CR

* The two credits for Physics are taken from the Home Economics course

CHART: SCIENTIFIC MODEL ACCORDING TO THE PROPOSAL OF THE CONSEIL SUPÉRIEUR DE L'ÉDUCATION

Grade	Secondary 1	Secondary 2	Secondary 3	Secondary 4	Secondary 5
Mathematics	Basic (6CR)	Basic (6CR)	Basic (4CR)	Basic (4CR) Option I (4CR)	Option II (4CR)
Sciences course	Ecology 4 (CR)	Physics (4CR)	Biology (4CR) Intr. to Technology (4CR)	Sciences 434 (4CR)	Chemistry (4CR) Physics (4CR)
Time devoted to science	100 H	100 H	200 H	100 H	200 H
Margin	2 CR	2 CR	0 CR *	4 CR	4 CR

* The Home Economics course is moved from Secondary 2 to Secondary 3 and reduces the margin to zero.

APPENDIX V

CONSULTATION

Association d'Économie familiale	(brief submitted)
Association des professeurs de sciences du Québec	(brief submitted)
Association des institutions d'enseignement secondaire	(brief submitted)
The Mrs Lorraine Bérubé Marie Orfaly Estelle Drouin	(brief submitted)
Task force of teaching consultants in Natural Sciences from the Metropolitan Region	(brief submitted)
Anglophones Sciences Consultants of the Montréal Region	(brief submitted)

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DE L'ÉDUCATION

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Sainte-Foy

Vice-Chairman

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Montréal

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Full Professor
Université Laval
(presently on sabbathical)
Montréal

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Teacher in Personal and
Social Training and pre-
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du Conseil supérieur de l'éducation

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